APTPEP1.048A PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Gerald A. Hutchinson, et al.
Appl. No.	:	10/614,731
Filed	:	July 3, 2003
For	:	DIP, SPRAY, AND FLOW COATING PROCESS FOR FORMING COATED ARTICLES
Examiner	:	Elena Tsoy Lightfoot
Group Art Unit	:	1792
Conf. No.	:	7527

DECLARATION UNDER 37 C.F.R. § 1.132

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Edward Socci, declare and state as follows:

1. I am the Senior Manager of the Advanced Packaging Technology Group, employed by PepsiCo Corporation.

2. I have worked in the plastics packaging industry for 14 years. My Curriculum vitae, including my list of publications, is attached to and forms part of this Declaration (Exhibit A).

3. Thermoplastic resin coated articles as described in the above-referenced application have been prepared in our labs in accordance with the procedures described in Exhibit B, which is attached to and forms part of this Declaration.

4. The composition of the coating materials, Oxybloc 670 C 1322-R and Oxybloc 670 C 1300-R, is presented in Exhibit C which is attached to and forms part of this Declaration. These Oxybloc materials include a thermoplastic polyhydroxyamino ether (PHAE) epoxy-amine polymer in combination with a blend of phosphoric and lactic acids. In particular, Oxybloc 670

C 1300-R has an acid content of 4.25% phosphoric acid and 0.75% lactic acid. Oxybloc 670 C 1322-R has an acid content of 1.45% phosphoric acid and 1.95% lactic acid.

5. The carbon dioxide (CO_2) and oxygen (O_2) transmission rates of the thermoplastic resin coated articles, as well as on control monolayer articles, have also been tested in our labs. The testing procedures are described in Exhibit D, which is attached to and forms part of this Declaration.

6. The CO_2 and O_2 transmission rate test results are presented in Exhibit E which is attached to and forms part of this Declaration. The permeability of these coatings to CO_2 and O_2 was calculated from the transmission rate data and is also presented in Exhibit E.

7. It is understood that the unit cc-mil/100in^2·atm·day as used for describing permeability data is normalized for the thickness of the coating layer.

8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information or belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statements may jeopardize the validity of the application or any patent issued thereon.

By: ______________________ Date: 8/6/2009
Edward Socci

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EXHIBIT A

Edward Peter Socci

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blsocci@verizon.net

Education

The University of Akron, Akron, Ohio — **Postdoctoral Fellow**
Institute and Department of Polymer Science
Postdoctoral Fellow, October 1994-March 1995

University of Virginia, Charlottesville, Virginia — **Departmental Fellow**
Graduate School of Engineering and Applied Science
Ph. D. Materials Science and Engineering, January 1995
M. S. Materials Science and Engineering, January 1993

Rutgers University, New Brunswick, New Jersey — **Honors**
College of Engineering
B. S. Applied Science in Engineering (Packaging Engineering Program) May 1990

Experience

PepsiCo Corporation, Valhalla, New York — September 2006-Present
Advanced Packaging Technology Group, *Senior Manager*

- Leading new materials technology team of senior scientists engaged in strategictechnology projects.
- Developing and commercializing barrier coating technology for shef life extension in carbonated beverages.
- Creating smart packaging technologies which provide increased functionalities and "better for you" products
- Actively managing technology supplier network of converters, universities, consultants and materials suppliers.
- Engaged in strategic plastics recycling and sustainability initiatives.

Honeywell International (formerly AlliedSignal, Inc), Morristown, New Jersey — April 1995-September 2006
Performance Products, *Leader, Materials Center of Excellence*

- Managed senior researchers and new technology programs in packaging resinsand fluoropolymers.
- Technology leader and co-developer of Aegis® oxygen scavenger resin for rigid and flexible packaging.
- Lead Aegis® to 2004 new product sales of >$7 million (from $500K in 2003) with global adoptions in PET containers.

The University of Akron, Akron, Ohio — August 1994-March 1995
Institute and Department of Polymer Science, *Postdoctoral Fellow*

- Research on structure/property relationships Kevlar® fibers
- Graduate student mentor

Recognition

- Honeywell Performance Products Quest for Excellence winner (2004)
- Honeywell Performance Products Patent of the Year (2004)
- Honeywell H. W. Sweatt Engineer-Scientist Award (Honeywell's Highest Technical Achievement Award) (2001).
- Honeywell Technical Achievement/ Award for High Barrier Nylon Program. (2001).
- Honeywell Engineered Applications and Solutions Technical Award (2001).
- Honeywell Engineered Applications and Solutions Director's award (2001).

Publications

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Socci, E. P., Lee, D. J., Palley, I., Kwon, Y. D. and Causa, A. G., "Design Criteria, Durability Forge Peak Performance, Maximum Value", 1997, *Rubber and Plastics News: ITEC Select.*

Socci, E. P., Thomas, D. A, Grubb, D. T., Adams, W. W. and Eby, R. K., "Orientation Changes in Kevlar 49 Under Axial Compression", 1996, *Polymer*, 37, 5005.

Socci, E. P, Farmer, B. L., Chabinyc, M. L., Fratini, A. V., Bunning, T. J. and Adams, W. W., "Structure of Cholesteryl-4-vinylbenzoate", 1995, *Acta Cryst.* **C51**, 888.

Chabinyc, M. L., Fratini, A. V, Socci, E. P, Farmer, B. L., Bunning, T. J. and Adams, W. W., "Structure of Cholesteryl-4-octenoxybenzoate", 1995, *Acta Cryst.* **C51**, 1444.

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Socci, E. P, Farmer, B. L. and Adams, W. W., "Molecular Dynamics Calculations on a poly(p-phenylene) Oligomer", 1993, *J. Polym. Sci., Polym. Phys.*, 31, 1975.

Baker, K. N., Fratini, A. V., Knachel, H. C., Resch, T., Adams, W. .W, Socci, E. P and Farmer, B. L., "Crystal Structures and Phase Transitions of poly(p-phenylene) Oligomers", 1993, Polymer, 8, 1571.

Socci, E. P., Farmer, B. L., Bunning, T. J., Pachter, R. and Adams, W. W., "Molecular Dynamics and X-ray Scattering Simulations of Cyclic Siloxane-Based Liquid Crystal Mesogens", 1993, *Liquid Crystals*, 6, 811.

Pachter, R., Bunning, T. J., Crane, R. L., Adams, W. .W., Socci, E. P, and Farmer, B. L., "Static and Dynamic Molecular Mechanics Modeling and X-ray Scattering Calculations for a Cyclic Siloxane Macromolecule", 1993, *Makromol. Chem., Theory Simul.*, 2, 337.

Socci, E. P, Farmer, B. L., Pachter, R., Adams, W. W. and Bunning , T. J., "Computer Simulation of Cyclic Siloxane-Based Liquid Crystals: Molecular Dynamics and X-ray Scattering, 1992, U. S. Air Force Technical Report, WL-TR-91-4137.

Pachter, R., Bunning, T. J., Socci, E. P, Farmer, B. L., Crane, R. L. and Adams, W. W., "Macromolecular Simulation: Cyclic Siloxane Based Liquid Crystals", 1992, *American Chemical Society Polymer Preprint.*

Patents

Socci, E. P., Pratt, J. D., Golden, T. H., Jhaveri, U., Kwon, Y. D. and Nelson, C. J., "**Composite Comprising Organic Fibers Having a Low Twist Multiplier and Improved Compressive Modulus**", United States Patent

Akkapeddi, M. K., Socci, E. P., Kraft, T, Pratt, J. D., "**Delamination Resistant high barrier polyamide compositions for packaging applications**", United States Patent Pending.

Akkapeddi, M. K., Socci, E. P., Kraft, T, Pratt, J. D., "**Oxygen scavenging high barrier polyamide compositions for packaging applications**", United States Patent 6,423,776.

Akkapeddi, M. K., Socci, E. P., Kraft, T, Worley, D. C., Pratt, J. D. and Brown, C. V. , "**Oxygen scavenging polyamide compositions suitable for PET bottle applications**", United States Patent 6,410,156.

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Akkapeddi, M. K., Socci, E. P., Kraft, T, Pratt, J. D., Worley, D. C., Pratt, J. D. and Brown, C. V. , "**Oxygen scavenging polyamide compositions suitable for PET bottle applications**", United States Patent 6,656,993.

Akkapeddi, M. K., Socci, E. P., Kraft, T, Pratt, J. D., Worley, D. C., Pratt, J. D. and Brown, C. V. , "**Oxygen scavenging polyamide compositions suitable for PET bottle applications**", United States Patent 6,685,861

Akkapeddi, M. K., Socci, E. P., Kraft, T, Pratt, J. D., Worley, D. C., Pratt, J. D. and Brown, C. V. , "**Oxygen scavenging polyamide compositions suitable for PET bottle applications**", United States Patent 6,756,444.

References

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EXHIBIT B

Dip coating procedure for preforms

Coated preform 2686

A polyethylene terephthalate (PET) preform weighing 23.5g was flame-treated and dip-coated in Oxybloc 670 C 1322-R (lot number 12773-80), an aqueous dispersion from Akzo Nobel Paints. After a 2-second drip time the bottom of the preform was wiped clean with a sponge and the remaining coating was dried for 40 seconds in an IR dryer using three 2,000W medium wavelength IR lamps. After drying, the coated preform had temperature of 160 degrees F. This resulted in a clear, dry film of the Oxybloc material deposited on the preform. The weight of the dry film was determined gravimetrically and was found to be 80 milligrams. The coated preform was allowed to equilibrate overnight and was blow-molded into a 16.9-oz PET bottle using Sidel LX-2 blow-molding machine.

Coated preform 2683

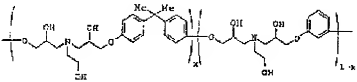
A polyethylene terephthalate (PET) preform weighing 23.5g was flame-treated and dip-coated in Oxybloc 670 C 1300-R (lot number 12773-84), an aqueous dispersion from Akzo Nobel Paints. After a 2-second drip time the bottom of the preform was wiped clean with a sponge and the remaining coating was dried for 40 seconds in an IR dryer using three 2,000W medium wavelength IR lamps. After drying, the coated preform had temperature of 160 degrees F. This resulted in a clear, dry film of the Oxybloc material deposited on the preform. The weight of the dry film was determined gravimetrically and was found to be 110 milligrams. The coated preform was allowed to equilibrate overnight and was blow-molded into a 16.9-oz PET bottle using Sidel LX-2 blow-molding machine.

EXHIBIT C

Oxy-Bloc Barrier Material

Oxy-Bloc is an aqueous based dispersion of a thermoplastic barrier polymer shown in table below, structure number 5). The formulation is composed of a mix of the epoxy based barrier polymer, a crosslinker, a defoamer (to suppress excess foaming when the material is pumped) and a blend of phosphoric and lactic acids. This formulation is manufactured and supplied by Akzo-Nobel:

- The barrier polymer is a thermoplastic polyhydroxyamino ether (PHAE) / Epoxy-Amine polymer produced by a reactive extrusion process to copolymerize ethanolamine (PA) with bis-phenol A diglycidyl ether (BADGE) and resorcinol diglycidyl ether (RDGE) (structure #5 below where x=0.5).



Structure No.	x	O_2TR*
2	1.0	0.80
3	0.75	0.38
4	0.7	0.20
5	0.5	0.04

*cc-mil/100 in²-atm-day

ANTEC 2000 Publication "New Thermoplastic Adhesive and Barrier Resins" T.Glass, H.Pham and M.Winkler, The Dow Chemical Company.

- The acid content in Oxy-Bloc dispersions is listed below:

Formulation	Acid Ratio in formulation	
	Phosphoric Acid	Lactic Acid
670-C-1300	4.25%	0.75%
670-C-1322	1.45%	1.95%

EXHIBIT D

August 4, 2009

Synopsis of CTR, OTR and Coating Thickness Measurement Methodologies at AP Lab

Carbon dioxide Transmission Rate (CTR) Determination for PET Bottles

- **Instrument:** Mocon, model Permatran-C, carbon dioxide permeation instrument equipped with capture volume fixtures. Known transmission rate films are used to calibrate the instrument.
- **Sample Preparation:** Sample bottles are chemically carbonated to a set carbonation level and equilibrated for a period of 21 days at 70°F and 50% Relative Humidity (RH).
- **CTR Measurement:** Carbonated bottles that have been equilibrated, are placed in a capture volume fixture were nitrogen gas sweeps the outside of the bottle carrying any amount of carbon dioxide gas (CO_2) that permeates through the bottle wall. This carrying gas passes through a CO_2 specific detector, were it is measured quantitatively over time. Measurements are expressed in cc of CO_2 (std) per package per day. Measurements are subsequently normalized for a set driving force of 3.8 gas volumes. During a measurement, samples are under dry conditions (zero percent RH).

Oxygen Transmission Rate (OTR) Determination for PET Bottles

- **Instrument:** Mocon, model Ox-tran 2/21-L, oxygen permeation instrument equipped with bottle mounting plate fixtures. The coulometric detector does not require calibration and the instrument is zeroed at the background signal/noise. A temperature/RH chamber is used to provide a set constant temperature and RH environment, externally to bottles under testing. The Ox-tran instrument regulates the RH at the inside of the bottles.
- **Sample Preparation:** Sample bottles are mounted with epoxy adhesive on the plate fixtures, inside the chamber, and equilibrated for a period of about 48 hours at the set external environmental conditions.
- **OTR Measurement:** Mounted bottles are swept internally with nitrogen gas carrying any amount of oxygen (O_2) that permeates from the outside atmosphere through the bottle wall. This carrying gas passes through the coulometric detector were it is measured quantitatively over time. Measurements are expressed in cc of O_2 (std) per package per day. During a measurement, samples are under the set environmental conditions of temperature and RH for each test requirement. Standard testing conditions are 70°F at 50% RH.

Coating Thickness Measurement on the External Surface of a Bottle Preform

- **Instrument:** Zeiss visible range fiber optic photo-diode spectrophotometer, model MCS501. Illuminating the optically transparent coating with white light results in interference spectrums which depend on the geometric coating thickness. Integrated software reports thickness of coatings at the fiber optic probe placement location.
- **Sample Preparation and Measurement:** Sample preforms are placed in a fixture were repetitively measurements can be taken at the same relative position of each preform. Measurements are taken at three different locations along the length of preforms and at 180 degrees along the periphery. Measurements are expressed in micrometers.

[redacted]

EXHIBIT E

OTR & CTR on FlowCoated PET Films

Samples were cut from the straight sidewall panel of 500 ml [redacted] bottles.

Material ID	Description	CO2TR (avg) /cc/m2/day	CO2TR (standard deviation) /cc/m2/day	CO2 BIF	External RH /%	Internal RH /%	Test Temperature /C	Side Wall Average Total Thickness /mm	Coating Average Thickness /(µm)	Coating BIF	PET Permeability /cc-mil/100 in2-atm-day	Coating Permeability /cc-mil/100 in2-atm-day
2517	Control monolayer	16.5	2.8		0	0	23	0.307			12.55	
2686	Basecoat 1322	9.2	1.6	1.74	0	0	23	0.323	1.9	135.2		0.093
2517	Control monolayer #2	15.6	0.7		0	0	23	0.307				
2683	Basecoat 1300	5.7	0.8	2.81	0	0	23	0.329	2.3	272.2		0.046

Material ID	Description	OTR (avg) /cc/m2/day	OTR (standard deviation) /cc/m2/day	O2BIF	External RH /%	Internal RH /%		Side Wall Average Total Thickness /mm	Coating Average Thickness /µm)	Coating BIF	PET Permeability /cc-mil/100 in2-atm-day	Coating Permeability /cc-mil/100 in2-atm-day
2517	Control monolayer	4.91			50	90	23	0.307			3.83	
2683	Basecoat 1300	2.94		1.72	50	90	23	0.329	2.3	113.6		0.034
2686	Basecoat 1322	3.94		1.28	50	90	23	0.323	1.9	56.4		0.068
2517	Control monolayer #2	5.19			50	90	23	0.307				
2517	Control monolayer	4.87	0.04		75	90	23	0.307			3.88	
2683	Basecoat 1300	4.16		1.20	75	90	23	0.329	2.3	37.9		0.102
2686	Basecoat 1322	4.75		1.05	75	90	23	0.323	1.9	16.3		0.237
2517	Control monolayer #2	5.08	0.04		75	90	23	0.307				

Magna-Mike Side Wall Thickness on FlowCoated PET 19.9 oz [redacted] Bottles

		Point 1	Point 2	Point 3	Avg (mm)	Std (mm)
2683 BC 1300	1	0.330	0.330	0.330	0.329	0.0092
	2	0.333	0.338	0.338		
	3	0.323	0.325	0.330		
	4	0.350	0.345	0.343		
	5	0.323	0.323	0.323		
	6	0.315	0.315	0.314		
	7	0.323	0.323	0.323		
	8	0.338	0.338	0.338		
	9	0.333	0.330	0.330		
	10	0.338	0.338	0.335		
	11	0.320	0.323	0.320		
	12	0.318	0.323	0.316		
2686 BC 1322	13	0.318	0.315	0.318	0.323	0.0070
	14	0.330	0.323	0.323		
	15	0.318	0.320	0.318		
	16	0.330	0.330	0.330		
	17	0.330	0.329	0.329		
	18	0.335	0.335	0.335		
	19	0.312	0.312	0.318		
	20	0.312	0.312	0.312		
	21	0.325	0.325	0.320		
	22	0.325	0.325	0.330		
	23	0.324	0.323	0.323		
	24	0.318	0.318	0.318		
Control Mono	25	0.307	0.307	0.305	0.307	0.0107
	26	0.316	0.316	0.318		
	27	0.330	0.334	0.330		
	28	0.315	0.315	0.315		
	29	0.312	0.312	0.310		
	30	0.305	0.292	0.293		
	31	0.295	0.294	0.295		
	32	0.307	0.305	0.305		
	33	0.295	0.295	0.295		
	34	0.310	0.295	0.300		
	35	0.315	0.310	0.307		
	36	0.301	0.302	0.300		

Coating thicknesses
Base boat only
bottles

	2686 Bottle 1		Bottle 2		Bottle 3		Bottle 4		Bottle 5	
Angle										
Middle	1.9	1.8	1.9	2.0	2.0	1.7	1.8	2.1	1.9	1.8
Bottom										

	2683 Bottle 1		Bottle 2		Bottle 3		Bottle 4		Bottle 5	
Angle										
Middle	2.3	2.3	2.3	2.2	2.6	2.0	2.2	2.3	2.2	2.3
Bottom										

1300 Base coat only

Avg Depo	Std Depo		
		Avg	Std
		1.9	0.10
		Avg	Std
		2.3	0.13